A NEW MOSQUITO-PROOF AND STORM-PROOF HOUSE FOR THE TROPICS

BY

T. F. G. MAYER,

WEST AFRICAN MEDICAL STAFF

(*Received for publication* 16 *January*, 1913)

PLATE IV

There are all kinds of houses in the tropics. There is the old house built on enormous piles so that its occupants may be well away from the damp of the ground; there is the house built on the ground; and there is the house that is raised on short pillars only three or four feet high.

Provision for ventilation is equally varied. In olden days the houses were designed in England, and the window area had the same relation to the floor area as obtains here; then the window area was increased to one-tenth that of the floor area; this proportion was again gradually increased, until now in some places a window area equal to one-half of the floor area is regarded as the minimum necessary for comfort.

The discovery of the transmission of malarial fever by mosquitos was followed by the grafting on of mosquito-proof wire gauze to the windows and doors of existing houses, with the result that in those in which the ventilation space was small, the rooms were made insufferably hot and stuffy; consequently, the mosquito-proofed window was made to open and shut and the house was turned into a mosquito trap.

With the closing in of the house by mosquito-proofing came the growth of the verandah and the diminution in size of the rooms, the verandah now being used as a living room except during cold or stormy weather.

From these few remarks it is clear that, even taking into account the demands of local conditions, house construction in many parts of the tropics is not based on such fixed principles to guide architects as obtain, for instance, in England.

The importance of efficient mosquito protection is well known. Its value as compared with quinine prophylaxis against malaria may be gauged from the following figures of Celli:—

Treatment	Infected with Malaria
Mosquito protection plus quinine	1·75 %
Mosquito protection alone	2·5 %
Quinine alone	20·0 %
No protection	33·0 %

The difficulty of completely protecting a house raised on pillars from mosquitos may also be noted. Faults in the flooring nearly always exist which allow of the entry of mosquitos.

Dr. Leonard Hill states that to render a room uncomfortably hot and stuffy, the air in it must be hot, damp and still. In many parts of the tropics the first two of these conditions are almost constant, the last only therefore concerns us here.

Three factors tend to keep still the air enclosed in a mosquito-proofed house.

1. The mosquito proofing itself, by shutting off more than 30 % of the space to which it is applied.

2. The loss of air movement owing to friction with the wires and to the interference with the air particles which impinge on the netting.

3. The division of the house by walls into rooms and passages hindering through ventilation.

Factors 1 and 2 should strictly be considered together, as a certain amount of the air impinging on the wires will ultimately pass through the netting. But without attempting the general consideration of the motion of the air, it is clear that for a given uncovered area the loss of movement will be greater for a small mesh than for a large one, on account of the greater length of edge of wire. If the uncovered area be equal to an open square of side a and consist of n small squares each way, then, as each side of a wire has its effect on the air movement, the total length of edge is $n^2 \times 4 \left(\frac{a}{n}\right) = 4an$.

Messrs. Humphreys, Ltd., of Knightsbridge—the makers of the first mosquito-proofed house used in Sir Patrick Manson's classical experiment—have designed for me a house for use in the tropics embodying certain principles which I believe are new.

The house here illustrated (Plate IV) is constructed almost entirely of steel; wood-work is reduced to a minimum, and, where its use is unavoidable, is specially treated to withstand the attacks of insects, especially white ants.

The house is built on a plinth of concrete and has a floor and a low wall of similar material. Their surfaces are cement-rendered. The walls are continuous with a steel framing, filled in completely with mosquito netting made of a specially woven composite material proved to be stronger and more durable than any other. This netting is sandwiched between perforated metal sheets, which prevent bulging and render entry impossible except by the spring doors at each end of the lobby-entrances.

The roof is covered with non-conducting fibro-cement slates and is ventilated by means of louvre windows at each end. It is completely shut off from the room below by an asbestos ceiling.

There are no walls or partitions within the mosquito proofing, so that whatever breeze there may be, blows straight through the house from one side to the other. Should this wind be too cold or too strong, as for instance during storms, it can be cut off at will, by shutters which are provided all round the house and which are capable of closing the whole of it. These are manipulated from within by turning a handle, and can be made either to come down from above, as illustrated, or to move upwards from below.

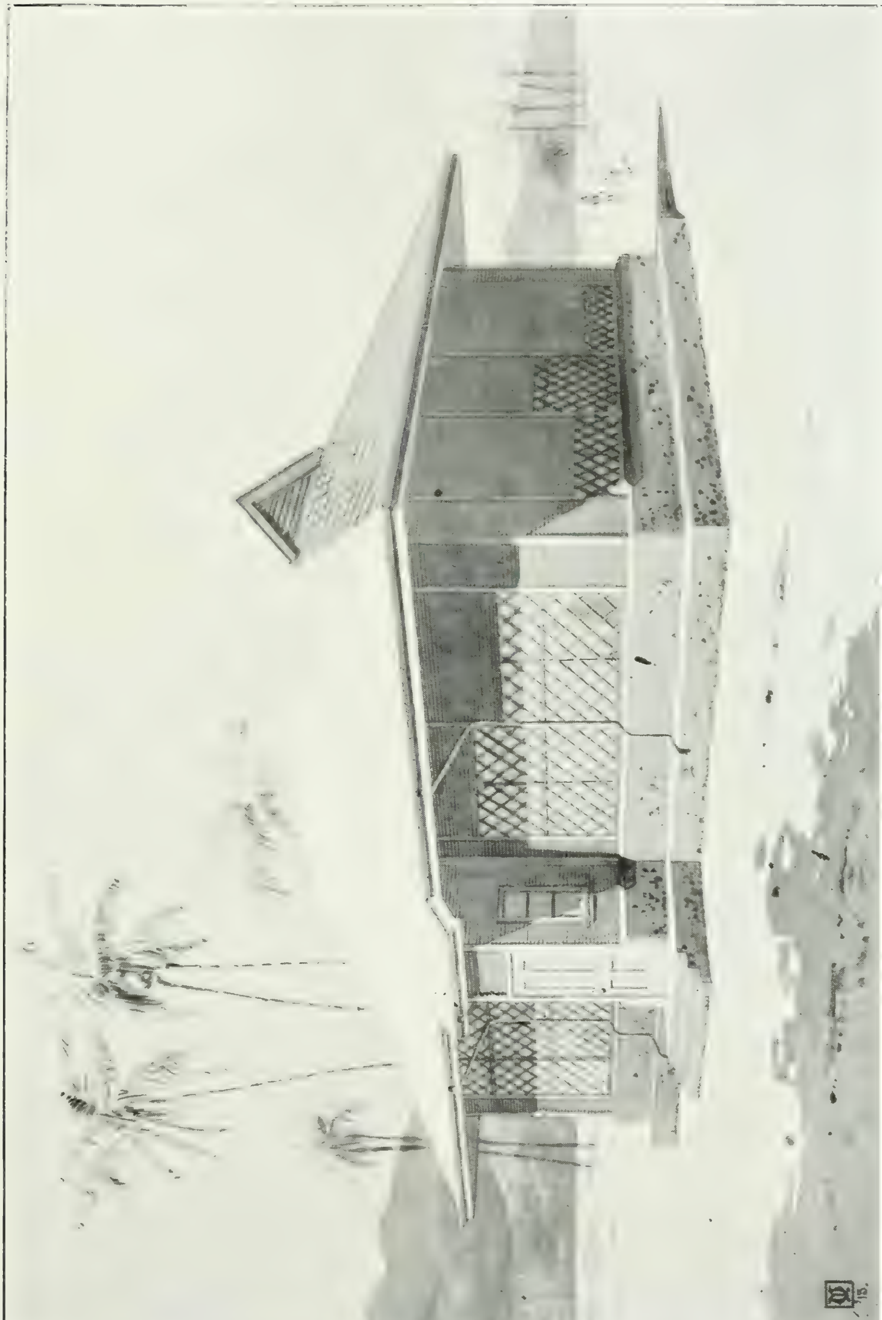
The division of the interior of the house is left to the occupant, the ideal being the minimum required for privacy, and it is suggested that by the use of sun blinds, screens and curtains, the open character of the house may be preserved, but permanent brick or stone walls may be built if desired.

It is possible to make the house of any number of stories, and to build it on piles if desired.

In the house we have been considering that the terms *wall area* and *available ventilation* space are almost synonymous; it must not be forgotten, however, that the proportion between wall space and cubic content vary greatly according to the size and shape of the building.

In buildings of the same shape the cubic content varies as the square of the wall area, provided that the height is constant; while a square house has a greater cubic content for a given wall area than an oblong one.

In conclusion I have to thank Sir Ronald Ross and Professor Simpson for their interest, and for many useful criticisms and suggestions. I have also to thank Messrs. Humphreys, Ltd., not only for the amount of work they have done, but also for their courtesy.



Designed by T. F. G. Mayer

NEW MOSQUITO-PROOF AND STORM-PROOF HOUSE FOR THE TROPICS

C. Tinling & Co., Ltd., Imp.